

CLAIMS

1. A method for measuring by means of ionization mobility spectrometry the concentration of water in argon, hydrogen, nitrogen and helium, characterized by comprising the followings operative steps:

- introducing the gas mixture to be analyzed into an IMS instrument (10) with a counter-flow of pure gas;
- obtaining a signal (19) variable during the time and proportional to the number of ions detected by an ion detector (14) of the IMS instrument (10);
- 10 - determining two time intervals (A, B) corresponding to the drift times in the IMS instrument (10) of the H_3O^+ and $(\text{H}_2\text{O})_2^+$ ions present in the gas mixture;
- obtaining the peaks of said signal (19) in the two determined time intervals (A, B);
- calculating the water concentration in the gas mixture according to the ratio
- 15 between the intensity of the two peaks obtained in the signal (19).

2. A method according to claim 1, characterized in that the water concentration in the analyzed gas is calculated by means of the following formula:

$$\text{ppb}_{\text{H}_2\text{O}} = K \ln ((\text{HB} + \text{HA}) / \text{HA}), \text{ wherein:}$$

- $\text{ppb}_{\text{H}_2\text{O}}$ is the water concentration in ppb,
- 20 - K is a positive constant,
- HA is the intensity of the peak of the signal (19) in the time interval (A) corresponding to the drift times of the H_3O^+ ions in the IMS instrument (10); and
- HB is the intensity of the peak of the signal (19) in the time interval (B)
- 25 corresponding to the drift times of the $(\text{H}_2\text{O})_2^+$ ions in the IMS instrument (10).

3. A method according to claim 2, wherein the area of the peaks is employed as a measure of said intensity of the same.

4. A method according to claim 2, wherein the height of the peaks is employed as a measure of said intensity of the same.

5. A method according to one of the previous claims, characterized in

that the two time intervals (A, B) corresponding to the drift times of the H_3O^+ and $(\text{H}_2\text{O})_2^+$ ions in the IMS instrument (10) are determined with a preliminary guiding test carried out with values of the operative parameters equal to those employed in the actual analysis.

5 6. A method according to claim 5, wherein said operative parameters comprise at least the temperature of the analyzed gas mixture.

 7. A method according to claim 6, wherein said operative parameters comprise also the electric field in the separation zone (12) of the IMS instrument (10).

10 8. A method according to one of claims 5 to 7, characterized in that the analysis is carried out with gases at the temperature of 110 °C and with an electric field in the separation zone (12) of 128 V/cm, and the two time intervals (A, B) corresponding to the drift times of the H_3O^+ and $(\text{H}_2\text{O})_2^+$ ions in the IMS instrument (10) are comprised between 15,5 and 17 ms (A) and between 17 and
15 19 ms (B).